

Name: _____

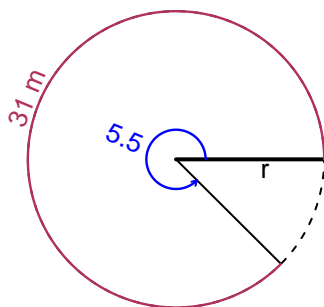
Date: _____

Trig Final (SLTN v634)

- You can use a calculator (like [Desmos](#))
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 31 meters. The angle measure is 5.5 radians. How long is the radius in meters?

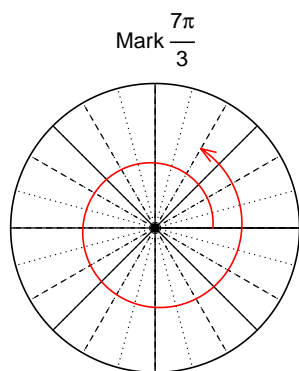


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 5.636$ meters.

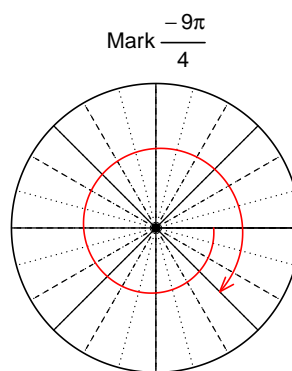
Question 2

Consider angles $\frac{7\pi}{3}$ and $-\frac{9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{7\pi}{3}\right)$ and $\sin\left(-\frac{9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(7\pi/3)$

$$\cos(7\pi/3) = \frac{1}{2}$$



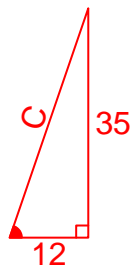
Find $\sin(-9\pi/4)$

$$\sin(-9\pi/4) = -\frac{\sqrt{2}}{2}$$

Question 3

If $\tan(\theta) = \frac{-35}{12}$, and θ is in quadrant II, determine an exact value for $\sin(\theta)$.

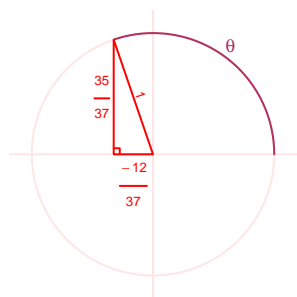
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}12^2 + 35^2 &= C^2 \\ C &= \sqrt{12^2 + 35^2} \\ C &= 37\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{35}{37}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -6.63$ meters, a frequency of 2.13 Hz, and an amplitude of 4.85 meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -4.85 \sin(2\pi 2.13t) - 6.63$$

or

$$y = -4.85 \sin(4.26\pi t) - 6.63$$

or

$$y = -4.85 \sin(13.38t) - 6.63$$